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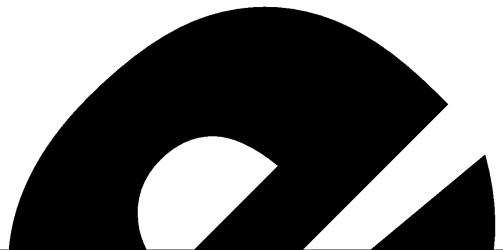

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DIRECTORATE OF
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DIA review completed.

Intelligence Memorandum

Preliminary Appraisal Of The Effects Of Recent Floods In North Vietnam

NGA Review Completed

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September 1971

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
September 1971

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INTELLIGENCE MEMORANDUM

PRELIMINARY APPRAISAL OF THE EFFECTS OF RECENT FLOODS IN NORTH VIETNAM

Summary and Conclusions

1. The floods that hit North Vietnam's Red River Delta during the last two weeks of August apparently rank with the most serious ever recorded (see Figure 1). Little loss of life has been detected, but damage to the country's important rice crop was severe, with potential losses of up to 15% of the crop. Some of the loss probably will be made up by replanting, and in any case imports of food from Communist allies can be expected to cover the remaining deficit. Disruption to the transportation system isolated Hanoi from other regions of the country and also from Communist China. Repairs to the transport system probably will be rapidly accomplished. Industrial installations incurred little physical damage, although some production was temporarily halted as a result of side effects of flooding. Photography of 3 September indicates that the flood waters had begun to receed by that time, though rail connections between Hanoi and China were still cut. Provided there are no further heavy rains, recovery work should move ahead rapidly.

2. The flooding in the Red River Delta is not likely to have a significant effect on the flow of supplies to the Panhandle of North Vietnam, or on the annual military resupply of the Laos Panhandle. Over the years the enemy has built extensive stockpiling facilities in the southern part of the country, particularly along major access roads leading from North Vietnam into Laos, and movement of stockpiled materiel probably will begin as usual in October.

Note: This memorandum was prepared by the Office of Economic Research and coordinated within CIA.

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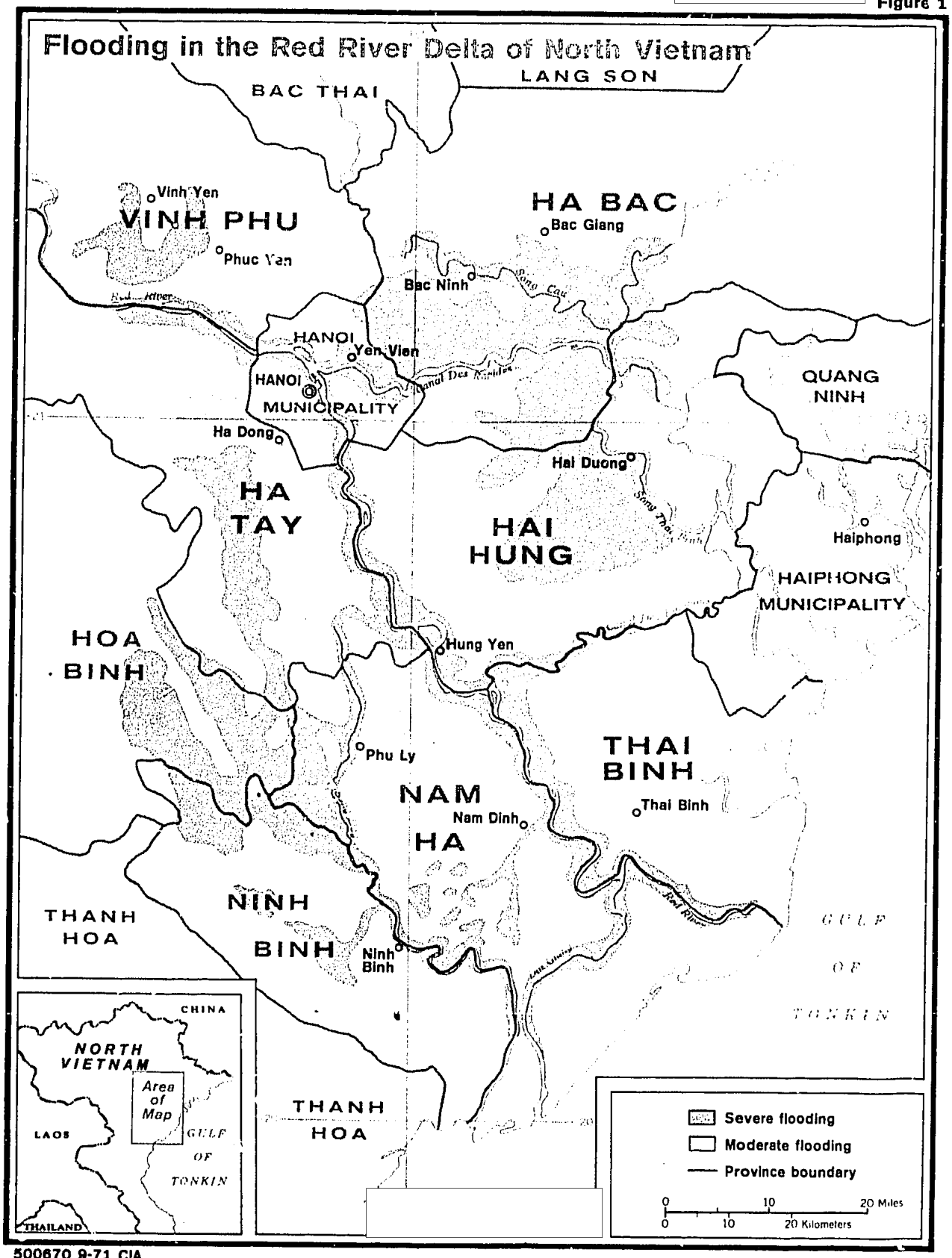
Figure 1



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Discussion

Chronology of 1971 Floods

3. North Vietnam's Red River Delta, the country's breadbasket and most populous region, was subjected to a siege of floods during the last two weeks of August from extremely heavy rainfall, which came on the heels of higher than normal precipitation in the preceding month. The course of the flood can be traced in press reports that depict serious localized flooding commencing in mid-July mainly in the provinces of Ha Tay, Ha Bac, and Nam Ha, urgent repairs to levees, and thousands of hectares of rice seedlings and transplants washed out. On 15 August, storms took out a one-half mile section of levee in Dong Anh ward, a suburb of Hanoi. It was probably this damage that caused the closing of the Hanoi-Dong Dang railroad, known to have been out of operation since 20 August.

4. Thereafter, the flood level apparently continued to increase.

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On the 29th, a *Nhan Dan* editorial again emphasized the necessity of protecting property and provided general instructions for the care of displaced people.

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Pham Van Dong in a speech on 31 August characterized the flooding as even worse than the catastrophic 1945 flood, but he implied that the greatest danger had passed. Press reports on 4 September indicated that restoration work was in progress.

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Historical Comparisons

5. Floods in the Red River Delta are a perennial hazard from June through September. The delta is a flat plain criss-crossed by rivers and manmade drainage and irrigation canals interwoven into a vast mosaic of ricefields. Viet Tri, at the head of the delta 100 miles inland, is only 43 feet above sea level, and the average slope of the delta to sea is less than 6 inches per mile. In this flat environment, levees are essential to protect

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the land from flooding by the rivers that cross it. By constricting the greatly expanded volume of floodwaters, however, the levees accentuate the threat created when the river level is above the level of the surrounding land. The Red River has flowed as much as 39 feet above the land in the Hanoi area, a situation that suggests the magnitude of flooding that would occur should the levees be breached. Levees protecting Hanoi and areas upstream rise 42 feet to 49 feet above the adjacent land. Secondary levee systems, averaging 20 to 40 feet, are intended to contain floods if the primary levees are breached, and these are backed up by 3 to 4 foot levees around individual rice fields. It is extremely difficult to drain these compartments, particularly when the bordering rivers are in flood and may be flowing above the elevation of the compartment. Moreover, persistent rains and prolonged soaking such as has occurred this season tend to weaken and undermine the entire levee system. As a result of the very gradual gradient of the river, floods stand for relatively long periods of time. Typically, the high-water period is not made up of a single flood with gradual upsurge and downfall, but rather it includes several floods, each of which may cause the river to rise far above the average summer water level.

6. Breaks occur somewhere in the levee system almost every year. One of the most significant floods occurred in 1915 when levees were breached in 48 places. In this instance, about 95% of the 268,000 hectares of land in Ha Tay Province were flooded. On 30 July 1926, three breaches occurred in levees not far from Hanoi. Two were closed within two weeks, but one remained open to flood over 250,000 hectares of land on the left bank of the Red River. The 1945 flood, to which Pham Van Dong referred, destroyed about 200,000 hectares of the rice crop. The North Vietnamese claim that 2 million people died in the ensuing famine. French estimates place the number at about 500,000. The high death rate was due to a combination of food shortages and distribution problems complicated by the Japanese occupation of the country.

7. Comparisons of monsoonal precipitation at selected points in the delta and in the northern part of the country are shown in the following tabulation:

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	Inches					
	Mean [a]		Greatest [a]		1971 [b]	
	July	August	July	August	July	August
Lang Son (Northeast)	11.0	11.0	20.9	23.9	20	15
Lao Cai (Northwest)	11.9	13.3	22.6	31.9	25	30
Tuyen Quang (North)	11.7	11.5	20.0	18.4	5-10	15
Bac Giang (Delta)	11.4	12.4	--	--	30	15
Hanoi (Delta)	12.1	12.8	27.0	19.1	30	15
Haiphong (Delta)	10.7	14.1	22.0	42.0	12	15
Nam Dinh (Delta)	9.1	13.1	20.5	24.2	15	10

a. NIS data that cover 20-40 years of recordkeeping.
b. DIA precipitation charts which depict rainfall to the nearest 5 inches, and from interpolation of these data.

Data for this season show that rainfall in 1971 was well above average – in some areas ranking with the greatest ever recorded. The heaviest period of rainfall in the delta reportedly took place during 13 to 19 August. Higher than average precipitation in the extreme northwestern part of the country flowing down the Black River, Clear River, and Red River also added to the delta's flood stage near Viet Tri, where these rivers converge.

Inundated Area

8. An aerial reconnaissance flight on 30 August provided photographic coverage of approximately 60% of the Red River Delta, probably at or near the time of flood cresting. Only the extreme eastern and western portions of the delta were not covered. Inundation is evident in the traditional flood plain surrounding Hanoi and heaviest in the provinces of Ha Bac, Hai Duong, and Ha Tay. Less severe flooding was observed in the lower delta in Hung Yen, Thai Binh, and Nam Ha Provinces. No breaks were observed in the levees protecting Hanoi nor in those upstream from the city. The only large city known to have been flooded is Hai Duong, about halfway between Hanoi and Haiphong (see Figure 2). Water reached

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roof-top level in some villages, although, in general, villages are safely on high ground while surrounding fields are inundated.

9. Aerial photography of 3 September shows that the flood was receding but that large areas still were inundated. Some additional flooding was observed south of Viet Tri although the area probably was not under cultivation. This photography also confirmed the continued obstruction to through-travel on the Hanoi-Dong Dang rail line.

Extent of Damage: Agriculture

10. Damage to agriculture apparently is more serious than to any other sector of the economy, with losses to the tenth-month rice crop approaching those of past disastrous years. Tenth-month rice, normally harvested in October-November, accounts for two-thirds of annual rice production. Measurement of inundated areas usually devoted to tenth-month rice shows that some 180,000 hectares are heavily flooded, and several thousand additional hectares are lightly flooded, resulting in potential destruction of as much as 15% of the total tenth-month crop. In terms of rice paddy, the tonnage could be in excess of 400,000 tons. Allowing for standard waste in milling, the potential loss represents almost 300,000 tons of polished rice. 1/ Although a large part of the flooded rice has likely been destroyed either from washing action or from being submerged too long, some of it probably can be salvaged. Furthermore, replacement of some of the destroyed seedings will be possible although late planting usually results in low yields.

11. Other crop losses are believed to be small. Part of the agricultural lands flooded in August are too low to be cultivated during the wet season because they are often inundated by a single heavy rain. Thus these lands are reserved for all of the fifth-month rice crop as well as most of the secondary foods (corn, sweet potatoes, beans, and peanuts) and industrial crops (oilseeds, cotton, jute, and tea) planted during the winter-spring dry season. There is no indication as yet of livestock losses.

12. Repair of damage to agriculture's physical facilities probably will require months to complete. Breached levees and washed out irrigation stations are common throughout the flooded areas [redacted] Housing

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1. Production of polished rice in 1970 is estimated to have been about 2.9 million tons.

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will have to be restored while stricken villagers share quarters with their more fortunate neighbors. Rebuilding of the levees must be given a high priority because of the continued threat of monsoon rains during September. Replanting of a portion of the damaged tenth-month crop is also a prime objective. Accomplishing all these tasks simultaneously obviously would tax the capabilities of the peasantry and, toward this end, the regime has pressed into service many army units for the coming weeks.

Transportation

13. Main transportation arteries were badly disrupted during the last half of August, although the extent of possible physical damage cannot be ascertained because of standing water. Inundation of the important Yen Vien rail junction north of Hanoi severed the two rail links with Communist China – the Hanoi-Dong Dang line and the Hanoi-Lao Cai line 25X1 The Yen Vien junction probably was put out of operation by 20 August when diplomatic communications revealed a closing of railroads to international travel. The highway running northeast from Hanoi toward 25X1 China also was cut. Rail and road connections from Hanoi to Haiphong were also flooded. Rail access from Hanoi to the southern part of the country also was severed with a washed out railroad bridge at Ninh Binh. 25X1 Road connections to the south suffered only nominal damage

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14. In the southern provinces of Nghe An, Ha Tinh, and Quang Binh, where military supplies currently are being shifted in preparation for delivery into southern Laos, there has also been some flooding. On 2 September, a major rail-to-road transshipment facility in the Vinh area reported that "due to flooding" an unidentified new system for shipping was to be utilized. Overall, however, the problems in the south are minor and should not hamper the enemy's upcoming dry season supply push in Laos.

15. The closest recent parallel to the difficulties being experienced with North Vietnamese transport was in September 1968 when heavy rains coupled with two typhoons caused extensive flooding in the Hanoi-Haiphong area. At that time the road and rail networks which had not yet been fully restored following the partial bombing halt were particularly hard hit. Despite the widespread flooding, the North Vietnamese were able to restore the transport system relatively quickly and, a month after the water had subsided, with little apparent difficulty were able to begin a massive transfer of their logistical base to the southern North Vietnamese Panhandle.

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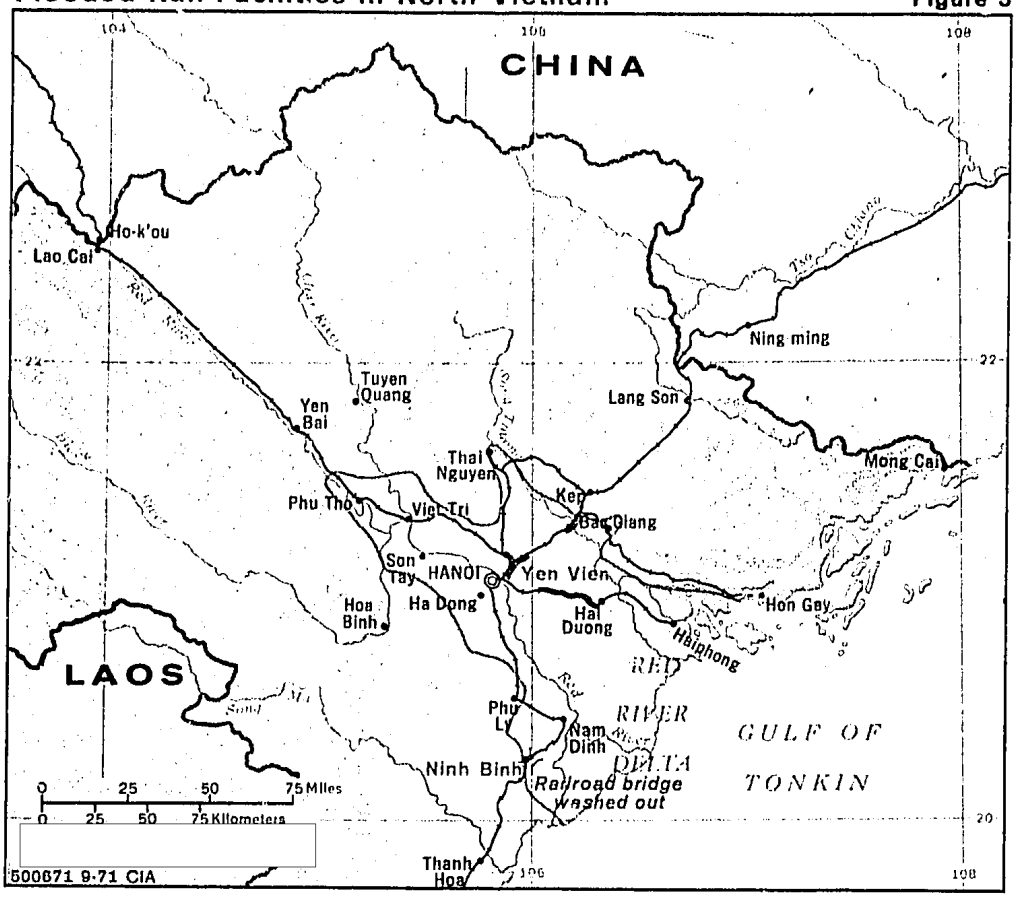
Flooded Rail Facilities in North Vietnam

Figure 5



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16. This year the main lines of communication also are likely to be restored soon after the flooding subsides. Temporary repairs to rail and road beds will probably not be difficult. During the course of the war the North Vietnamese have demonstrated considerable ability and experience in carrying out quick repairs to restore vital lines of communication.

17. In any case the disruptions to transport caused by flooding in northern North Vietnam will not have any significant direct bearing on the enemy's ability to support the war in southern Indochina, although there could be temporary and localized supply problems caused either by bottlenecks or by diversions of military personnel to flood work. Over the

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years the enemy has built up extensive stockpiles in southern North Vietnam, particularly along the major access roads leading from North Vietnam into Laos, and the advent of the northeast monsoon in October will see the Communists beginning to move this material into southern Laos.

Industry

18. Of the few major industrial facilities observed in photography, none was damaged by flooding. These included the manufacturing plants in Hanoi, the Bac Giang powerplant, and the Thai Nguyen Iron and Steel Complex. Some shutdown of industry apparently took place, however, as a radio broadcast on 27 August pointed out that the electricity, coal, construction materials, forestry, and construction branches should try to "resume" operations as soon as possible. The outages that have occurred probably have stemmed from disrupted supplies, washed out power lines, or inability of workers to reach their jobs. Storms and flooding reported in Quang Ninh Province may have obstructed coal mining operations, 25X1 particularly in the open pit mining areas.

25X1 The principal industrial "cost" inflicted by the flood will be production forgone. At most, this will probably put a crimp in the annual plan fulfillment of some factories, but the overall effect on industrial output will probably be marginal.

Population

19. The incidence of death resulting from recent flooding is believed to be low. 25X1 Probably the greatest hazard at this time would come from exposure, communicable disease in crowded living conditions, or infection from raw sewage and other harmful substances in flood waters. Although some 5 million people live in the provinces primarily affected by the floods, there is little basis with which to judge the numbers that have had to be evacuated and exposed to unhealthy conditions.

Foreign Aid

20. North Vietnam's losses from the flood can be readily offset by 25X1 imports from its Communist allies. 25X1

On 2 September, both the USSR and Communist China broadcast public offers of assistance, and the USSR claimed to be sending medicines, food, and other emergency goods.

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21. The potential loss of food from flooded rice crops presents the most significant category of supplies to be replaced. The rate of food imports in the first half of 1971 appears to be about the same as in 1970, when 660,000 tons were delivered, as shown in the following tabulation. If the additional import requirement is set at the maximum estimated loss of 300,000 tons, total food imports in 1971 would exceed the 1968 level. However, if part of the damaged rice can be salvaged or replanted, the total imports this year may not be as great as in 1968. At current prices, 300,000 tons of rice would be worth about $45 million. This tonnage in substitute wheat flour is worth about $30 million. The total value of Communist economic aid to North Vietnam in 1970 was in excess of $500 million.

Thousand Metric Tons

	1965	1966	1967	1968	1969	1970	1971 a/
Communist countries	60	65	460	800	750	660	310
Of which:							
USSR	Negl.	5	165	270	320	445	190
China	15	40	200	420	370	150	80

a. First six months.

22. Requirements for other types of goods should be small. Most of the flood damage has taken place on the land and along transportation routes. Restoration requirements, therefore, will entail manpower, earthmoving equipment, and perhaps some steel and cement. Beyond this, there seems to be no urgent requirement for imports of specialized equipment.

23. North Vietnam's maritime facilities should be able to cope with any increase in imports required. Seaborne imports into North Vietnam during August did not reflect internal transportation difficulties. Imports for the month were 125,400 tons, which compares with an average of 124,300 tons during the month of August in each of the years 1967 through

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1970. There was also no evidence of significant congestion in Haiphong harbor. The seaborne import of the additional foodstuffs resulting from the flood damage -- say 300,000 tons -- could be spread over a period of six months and, at 1,650 tons per day, should not present an excessive burden on the country's port capacities or on the main internal transport system.

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